

# Laparoscopic Gastric Bypass for Morbid Obesity—a Randomized Controlled Trial Comparing Two Gastrojejunal Anastomosis Techniques

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## ABSTRACT

**Objectives:** We present a randomized controlled trial of laparoscopic gastric bypass comparing 2 techniques of gastrojejunostomy in patients with morbid obesity.

**Methods:** Eighty consecutive patients underwent laparoscopic Roux-en-Y gastric bypass between September 2005 and August 2006. Patients were randomly assigned to 2 groups by the use of sealed envelopes. In group A, the gastrojejunal anastomosis was performed with a 21-mm circular-stapler, and in group B, this anastomosis was performed with a 45-mm linear-stapler. The rest of the procedure was identical in both groups. Variables evaluated were complications involving the gastrojejunostomy, operative time, length of stay, and percentage of excess weight loss.

**Results:** Both groups were similar in age and body mass index. No patients experienced leakage or gastrojejunal anastomosis fistula, but group A patients had a more frequent stricture rate ( $P < 0.05$ ). Operative time and hospital stay were comparable in both groups ( $P > 0.05$ ). Percentage excess weight loss at one year following surgery was satisfactory in both groups, without a statistically significant difference ( $P > 0.05$ ).

**Conclusion:** Gastrojejunal anastomosis does not seem to be a critical factor in excess weight loss for morbidly obese patients who underwent laparoscopic gastric bypass. The 2 techniques used in this experience are safe and effective; however, the 45-mm linear-stapler is preferable because it has a lower stricture rate.

**Key Words:** Laparoscopic gastric bypass, Stricture, Gastrojejunostomy, Excess weight loss.

## INTRODUCTION

Roux-en-Y gastric bypass is the technique of choice for the treatment of morbid obesity. Since the introduction of the laparoscopic approach by Wittgrove et al,<sup>1</sup> different ways to perform the same procedure have been described, gastrojejunostomy being one of the variable steps among surgeons.

It has been said that gastrojejunostomy diameter is very important for the results of this procedure, especially regarding excess weight loss; however, in recent years some studies have shown that weight loss is independent of the anastomotic technique used.<sup>2-7</sup>

In this study, we compare 2 different gastrojejunostomy techniques, performing the rest of the procedure in the same way.

## METHODS

This was a randomized controlled trial. From September 2005 to August 2006, 80 consecutive patients with morbid obesity were scheduled for a laparoscopic Roux-en-Y gastric bypass (LRYGB).

Patients were randomly assigned to 2 groups by the use of sealed envelopes. In group A ( $n = 40$ ), the gastrojejunostomy was performed with a 21-mm circular-stapler (Ethicon Endo-Surgery, Cincinnati, Ohio), and in group B ( $n = 40$ ) this anastomosis was performed with a 45-mm linear-stapler (Ethicon Endo-Surgery, Cincinnati, Ohio).

Written consent was obtained from each patient, and the local ethics committee gave permission.

Patients with previous bariatric procedures and conversions to laparotomy were excluded.

## Operative Procedure

The surgeries were performed by 3 surgeons (Dr. Leyba, Dr. Navarrete, and Dr. Navarrete) using a standard technique. The complete laparoscopic procedure has been previously described. In summary, an LRYGB is performed with a 30-mL gastric pouch, antecolic gastric limb, and latero-lateral jejunojejunostomy with a 45-mm linear-stapler (LS).<sup>8-10</sup> For patients whose body mass index

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(BMI) was less than 50 kg/m<sup>2</sup>, we used a 100-cm gastric limb, and for those whose BMI was ≥50 kg/m<sup>2</sup>, we used a 150-cm gastric limb.

For Group A, the gastrojejunostomy was constructed by passing the anvil transorally using a nasogastric tube. The handpiece of the circular-stapler (CS) is introduced directly through the abdominal wall and then passed into the gastric limb to perform the anastomosis.

For Group B, a gastrotomy and an enterotomy were created to provide access for the stapler. The legs of a 45-mm LS were introduced 18 mm into the gastric and jejunal lumina, and the stapler was fired to perform the gastrojejunostomy. The common enterotomy was closed using 2 layers of 2–0 polyester running sutures.

All patients had an abdominal drainage located in the left subhepatic space for 5 to 7 days after surgery.

Oral fluids were started on the second postoperative day, and patients were discharged from the hospital when tolerance was good.

Data were prospectively collected with emphasis in gastrojejunostomy complications, operative time, length of stay, and percentage of excess weight loss.

Wilcoxon and Fisher exact tests were used to analyze differences between groups.  $P < 0.05$  was considered significant.

## RESULTS

Patient's age and body mass index were similar in both groups (**Table 1**), and the 2 main gastrojejunostomy complications were bleeding and stricture; the latter was significantly more frequent in Group A,  $P < 0.05$  (**Table 2**). Patients who developed anastomotic stricture were successfully treated by endoscopic balloon dilation; however, one patient (Group A) presented with severe abdominal pain and pneumoperitoneum and a microperforation was

diagnosed. A relaparoscopy was done in this patient for abdominal lavage and drainage with good results. No leaks or fistulas at the gastrojejunostomy occurred in any patient. One patient had a wound infection at the port site used for the extraction of the CS, which was successfully treated by wound opening and dressing.

The operative time was 162 minutes on average in Group A (range, 120 to 300), and 156 minutes on average in Group B (range, 90 to 270),  $P > 0.05$ ; hospital stay was 3.2 days on average in Group A (range, 2 to 7) and 3.5 days on average in Group B (range, 2 to 6),  $P > 0.05$  (**Table 3**).

Sixty-one patients (76.2%) completed 1 year of follow-up, 33 in Group A and 28 in Group B,  $P > 0.05$ . The percentage of excess weight loss at 1 year following surgery was 92.2% in Group A (range, 60 to 100) and 84.1% in Group B (range, 50 to 100),  $P > 0.05$ .

No mortality occurred in the series.

## DISCUSSION

Since Wittgrove et al<sup>1</sup> described the first laparoscopic gastric bypass, many variations of the original technique have been reported. Our practice began following this technique step by step, and throughout our experience, we have made modifications.<sup>8–10</sup>

**Table 2.**  
Complications Following 2 Types of Gastrojejunostomy Techniques

Complication	Group A/CS* n (%)	Group B/LS* n (%)	P
Bleeding	2 (5)	1 (2.5)	>0.05
Stricture	7 (17.5)	1 (2.5)	<0.05
Ulcer	1 (2.5)	0	>0.05
Wound infection	1 (2.5)	0	>0.05

\*CS=circular-stapler; LS=linear-stapler.

**Table 3.**  
Operative Time (OT) and Hospital Stay (HS)

	Group A/CS*	Group B/LS*	P
Mean OT (minutes)	162 (120–300)	156 (90–270)	>0.05
Mean HS (days)	3.2 (2–7)	3.5 (2–6)	>0.05

\*CS=circular-stapler; ELS=linear-stapler.

**Table 1.**

Distribution by Age, Sex, and Body Mass Index (BMI)

	Group A/CS*	Group B/LS*	P
Mean Age (years)	32 (22–61)	30 (19–57)	>0.05
Mean BMI (kg/m <sup>2</sup> )	45.2 (35–57)	44 (35–57)	>0.05
Sex No. (%)	30 (75) F 10 (25) M	31 (77.5) F 9 (22.5) M	>0.05

\*CS=circular-stapler; LS=linear-stapler; F=female; M=male.

Some possible technical variations in the LRYGB are the gastrojejunostomy technique, length and rout of the gastric limb, use of rings at the gastric pouch, and gastrosomy at the gastric remnant.

Complications involving gastrojejunostomy (stricture, bleeding, leaks, and fistulas) frequently result in additional procedures and sometimes require hospital readmission.<sup>2-4,9,11-16</sup> We believe the best way to avoid these complications is to evaluate different techniques in a prospective manner.

Our results are similar to those reported in the literature, the stricture being the most common complication of the gastrojejunostomy. In this study, the stricture rate was significantly higher with the 21-mm CS technique, which is consistent with previous reports.<sup>2,3,7,11,17-19</sup>

In a recent paper, Takata et al<sup>2</sup> concluded that the use of a 21-mm CS was the only independent predictor of a gastrojejunostomy stricture in 379 patients who underwent Roux-en-Y gastric bypass with 4 gastrojejunostomy techniques (hand-sewn, LS, 21-mm CS, and 25-mm CS).

Our trial results support Takata's study, because we had a lower gastrojejunostomy stricture rate using the LS technique. Stricture incidence has been previously reported variously in 4% to 7% of patients with the LS technique,<sup>6,12,15,19</sup> and our stricture rate was even lower (2.5%). Nonetheless, some of these authors do not accurately report the size of the anastomosis, which can vary according to the depth at which the stapler is introduced into the gastrojejunal opening. Also the stricture can be related to the technique used for closure of this opening (stapled vs hand-sewn).

Some authors<sup>4,11</sup> have reported an increased frequency of wound infection with CS, related to the extraction of the contaminated hand piece through a port site. In our study, one patient in Group A had a wound infection at this port site; however, this does not represent a significant difference (**Table 2**). Other complications related to the gastrojejunostomy like bleeding, ulcers, leaks, and fistula are present with all the techniques reported, without statistical differences, as occurred in our series.<sup>3-5,11-15</sup>

Some authors<sup>4,11,20</sup> have reported a longer operative time with CS; nevertheless, we found no difference between these techniques, perhaps due to our previous experience with CS, particularly in the passing of the transoral anvil.<sup>8-10</sup>

One of the most important objectives of our work was to determine the percentage of excess weight loss with the 2

gastrojejunal anastomosis techniques. It has been said that the size of the gastrojejunostomy is very important regarding excess weight loss, the bigger the anastomosis, the lesser the excess weight loss. However Abdel-Galil et al<sup>6</sup> did not find any difference in excess weight loss in 90 patients operated on with 3 different gastrojejunostomy techniques (CS, LS, and hand-sewn). Also in a retrospective study, Shope et al<sup>4</sup> evaluated the weight loss between LS and CS gastrojejunal anastomosis with no differences found at 6-month and 8-month follow-up.

Other studies<sup>3,5,7,17</sup> have reported no differences in excess weight loss, comparing 21-mm with 25-mm CS used to perform the gastrojejunostomy.

At 1-year follow-up, we did not find statistically significant differences in excess weight loss between the 21-mm CS and the LS techniques; however, a long-term follow-up is being carried out to confirm this issue. Complications, length of stay, and percentage of excess weight loss were similar between both techniques; however, there was an increased incidence of stricture in the CS group (17.5% vs 2.5%,  $P < 0.05$ ). Treatment of these strictures by endoscopic dilation showed very good results, but it is not free of complications.

## CONCLUSION

Both gastrojejunal anastomosis techniques (CS-21mm and LS) are safe and effective; however, the 45-mm liner-stapler is preferable because it has a lower stricture rate. Long-term follow-up is mandatory if we want definitive conclusions.

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